

**FINAL
FIELD SAMPLING PLAN ADDENDUM**

**BLADES GROUNDWATER
TOWN OF BLADES, SUSSEX COUNTY
DELAWARE**

EPA CONTRACT NO.: EP-S3-15-02
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Prepared For:



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FINAL
FIELD SAMPLING PLAN
BLADES GROUNDWATER
BLADES, SUSSEX COUNTY, DELAWARE

Ex. 4 CBI

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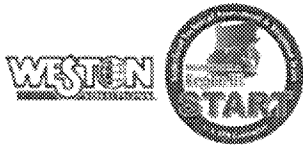


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1.0 INTRODUCTION

Under the Eastern Area Superfund Technical Assessment and Response Team (START) Contract No. EP-S3-15-02, Technical Direction Document No. W503-18-04-001, the U.S. Environmental Protection Agency (EPA) Region III tasked Weston Solutions, Inc. (WESTON®) to collect groundwater samples at the Blades Groundwater Site (the Site) located in Blades, Sussex County, Delaware. The Site consists of groundwater plume contaminated with per- and polyfluoroalkyl substances (PFAS).

2.0 OBJECTIVE OF SAMPLING

Groundwater samples were previously collected at the Site as part of a Site Inspection (SI) investigation from newly installed monitoring wells in November 2018. Groundwater samples were collected for PFAS analysis in accordance with the EPA approved Field Sampling and Analysis Plan data September 18, 2018, which specified analysis using the laboratory modified version of EPA Method 537 Version 1.1 (WESTON, 2018a and EPA, 2009). The laboratory actually logged samples in for PFAS analysis following the drinking water method which requires Trizma preservation. The ESAT contractor qualified the analytical data because the samples were not preserved with Trizma and the pH of the samples was outside of the optimal range for the EPA Method 537 Version 1.1 (EPA, 2009). The objective of this resampling round is to collect groundwater samples from select wells for re-analysis of PFAS. Groundwater samples will be preserved with Trizma in accordance with EPA Method 537 Version 1.1. The data will be incorporated into a preliminary Hazard Ranking System (HRS) score, which will be calculated to document if the Site has an exposure pathway that would score and would qualify for placement on the National Priorities List (NPL). This Field Sampling Plan (FSP) provides a description of the field activities related to this sampling event. WESTON developed the FSP in accordance with the provisions of the *Final Uniform Federal Policy Program Quality Assurance Project Plan (UFP-QAPP), EPA Region III Superfund Technical Assessment and Response Team 5 (START-5 Contract)* (WESTON, 2015a).

3.0 PROPOSED ACTIVITIES

This section describes the scope of work, including proposed sampling activities and field measurements; summarizes samples for the project; explains how samples will be collected and



handled; and describes equipment decontamination procedures and the disposal of investigation-derived waste (IDW) generated during sampling.

3.1 SCOPE OF WORK

As part of the sampling event, WESTON will perform the following tasks:

- Collect up to 14 groundwater samples, including one field duplicate, from EPA installed groundwater monitoring wells, existing groundwater monitoring wells at Procino Plating, and from the Town of Blades observation well.
- Collect 1 groundwater sample from a raw water sampling port from each of the three Town of Blades municipal supply wells. A duplicate sample will be collected from one of the ports.
- Collect a total of 16 field reagent blank (FRB) samples; an FRB will be collected at EACH sample location.
- Collect one rinsate blank per day from the tubing used to collect the sample.
- Enter sample information into a Scribe database.
- Photodocument sampling activities and sampling locations.
- Package and ship all samples to the Tier IV laboratory (i.e., WESTON-subcontracted laboratory) for PFAS analysis.

3.2 SAMPLE COLLECTION

The sampling team will use appropriate hand washing procedures and don clean nitrile gloves when handling bottleware during sample collection to reduce the possibility of sample contamination from common sources of PFAS, such as waterproof or stain-resistant clothing, aluminum, food packaging, and certain foods and beverages, and other precautions as specified in WESTON SOP 201a (WESTON, 2018b). A new, clean set of nitrile gloves will be donned prior to collection of the PFAS samples at each sample location in accordance with the sample collection methods described in EPA Method 537 Version 1.1 (EPA, 2009). The sample team will not wear stain-resistant or treated clothing during the



sample collection process or use Post-It notes or waterproof logbooks while sampling. Water-resistant sample identification tags will not be used on samples that will be analyzed for PFAS.

3.2.1 GROUNDWATER SAMPLING

Groundwater samples will be collected the monitoring wells in accordance with WESTON SOP No. 201a, Groundwater Sampling for Perfluorinated Compounds (PFCs) (WESTON, 2018b) and with EPA Low-Flow (Minimal Drawdown) Ground-Water Sampling Procedures (EPA, 1996a).

Groundwater monitoring wells will be purged, and groundwater samples will be collected using a peristaltic pump. Dedicated sample tubing will be composed of high-density polyethylene (HDPE). Tubing will be discarded after the well is sampled. The pump will be decontaminated using a phosphate-free detergent such Liquinox detergent followed by a rinse with PFAS-free water obtained from the laboratory that analyzes the PFAS samples. Wells will be purged using low-flow purge and sample methodology, while temperature, pH, specific conductance, dissolved oxygen, oxidation-reduction potential, and turbidity will be monitored using a calibrated multi-parameter water quality meter installed in a flow-through cell. Depth to water will also be monitored using a decontaminated electronic water level probe. Pumping of the wells will continue until three successive, 5-minute interval readings of the general water quality parameters stabilize according to the following criteria:

- pH: ± 0.1 unit
- ORP (Eh): ± 10 millivolts (mV)
- Temperature ± 0.1 degrees Celsius ($^{\circ}\text{C}$)
- Specific conductance: $\pm 3\%$
- DO: $\pm 10\%$

Once stabilization is achieved, the flow-through cell will be removed from the equipment chain, and the sample water will be collected for PFAS directly from the pump discharge sample tubing. Samples will be collected in laboratory-provided, high-density polyethylene (HDPE) bottles preserved with Trizma. At each sample location, an FRB will also be collected by pouring pre-preserved laboratory grade PFAS-free water into a clean laboratory-provided HDPE bottle. Table 1, Analytical Parameters, Containers, and Holding Times Table, summarizes the analyses, analytical methods, containers, preservatives, quality assurance/quality control (QA/QC) samples, and technical holding times for the samples proposed for collection during the sampling event.



3.3 SAMPLE IDENTIFICATION

The Sample Identifier will be listed on the chain-of-custody document for each groundwater and FRB sample and will provide the date and sample location as follows:

BDE-MW-XX

The “BDE” prefix refers to the site name (Blades, Delaware). The XX portion of the Sample Identifier refers to the groundwater monitoring well ID (e.g., MW-01). A field duplicate sample will be identified by adding a “-D” suffix to the Sample Identifier. The associated FRB for each sample location will be identified by adding “FRB” to the suffix of the Sample Identifier as follows:

BDE-MW-XX-FRB

In addition to the Sample Identifier, samples to be shipped to the Delivery of Analytical Services (DAS) laboratory for analysis will be assigned unique CLP sample numbers. Organic samples will be identified in the format C##### (where the # may represent a number or letter). The CLP sample number and the Sample Identifier will be included on the chain-of-custody, the bottle labels, and the sample tags attached to each bottle. Water-resistant sample tags will not be used on samples that will be analyzed for PFAS.

3.4 SAMPLE MANAGEMENT

WESTON will document field activities using logbooks, photographic records, and chain-of-custody documentation. Documentation, record keeping, and data management activities will be conducted in accordance with the WESTON UFP-QAPP (WESTON, 2015a) and in accordance with the *Sampler's Guide: Contract Laboratory Program Guidance for Field Samplers* (EPA, 2014), unless otherwise specified. Each sampling location will be noted in the field logbook in accordance with WESTON SOP No. 101, Logbook Documentation (WESTON, 2015b). Scribe software will be used for sample documentation and data management.

Sample handling, packaging, and shipment procedures will be in accordance with the *Sampler's Guide: Contract Laboratory Program Guidance for Field Samplers* (EPA, 2014). Sample labels and tags will be affixed to each sample bottle or jar shipped to the CLP or DAS laboratory. Samples will be placed in plastic zipper bags. Bagged containers will be placed in coolers with separately bagged ice. All



sample documents will be sealed in a plastic zipper bag and affixed to the underside of each cooler lid. The lid will be sealed with shipping tape, and custody seals will be affixed to the cooler. Coolers will be labeled with the origin and destination locations.

Chain-of-custody documents will be completed using Scribe software and will accompany field samples to the laboratory in accordance with WESTON SOP No. 103, Chain-of-Custody Documentation (WESTON, 2019). Samples will be shipped to the designated laboratory via Federal Express. Regulations for packaging, marking, labeling, and shipping hazardous materials and wastes are promulgated by the U.S. Department of Transportation. Air carriers that transport hazardous materials require compliance with the current International Air Transport Association (IATA) regulations, which apply to shipment and transport of hazardous materials by air carrier. WESTON will follow all applicable IATA regulations.

3.5 DECONTAMINATION AND INVESTIGATION-DERIVED WASTE

Dedicated, disposable sampling equipment and personal protective equipment (PPE) will be used wherever applicable. Disposable sampling equipment and PPE will be double-bagged and disposed of as dry industrial waste. Non-dedicated sampling equipment, such as submersible bladder pumps, will undergo a gross decontamination between each sampling point with a phosphate free detergent such as Liquinox detergent followed by a double rinse with distilled water, in accordance with WESTON SOP No. 301, Decontamination Procedures (WESTON, 2015c).

IDW is defined as any byproduct of the field activities that is suspected or known to be contaminated with hazardous substances. IDW for this sampling event will consist of purge water pumped from groundwater monitoring wells. IDW will be handled in accordance with Office of Land and Emergency Management (OLEM), formerly Office of Solid Waste and Emergency Response (OSWER) 9345.3-02 and WESTON SOP No. 019, Investigative Derived Waste Compliance Plan (WESTON, 2016).

4.0 ANALYTICAL PARAMETERS AND METHODS

Samples will be analyzed for PFAS in accordance with EPA Method 537 Version 1.1 (EPA, 2009). PFAS analytes will include the following:

- Perfluorooctanesulfonic acid (PFOS).



- Perfluorooctanoic acid (PFOA).
- Perfluorononanoic acid (PFNA).
- Perfluorohexanesulfonic acid (PFHxS).
- Perfluoroheptanoic acid (PFHpA).
- Perfluorobutanesulfonic acid (PFBS).

Table 1, Analytical Parameters, Containers, and Holding Times Table, which summarizes the analyses, analytical methods, containers, preservatives, QA/QC samples, and technical holding times for the samples proposed for collection during the sampling event, is attached.

5.0 QUALITY ASSURANCE AND QUALITY CONTROL PROCEDURES

This section describes the QA and QC procedures for personnel during the site sampling event, including responsibilities, field QC, laboratory QC, data evaluation, and data management.

5.1 FIELD QUALITY CONTROL

Field QA/QC measures will consist of collecting field duplicates and field blanks (e.g., ambient field reagent blank samples [for PFAS only] and equipment rinsate blank samples). These measures will be applied in accordance with the WESTON UFP-QAPP (WESTON, 2015a). The number and types of QC samples to be collected are summarized in the Table 1.

Field duplicate samples will be collected at a rate of one per 20 samples per sample matrix and will be used to test the reproducibility of sampling procedures and analytical results.

Equipment rinsate blanks will be collected from non-dedicated sampling equipment at a frequency of one per day or one per 20 samples per matrix for each sampling equipment type for each parameter to be analyzed, whichever is more frequent. Equipment blank results will be used to verify proper decontamination of non-dedicated sampling equipment. WESTON will obtain PFAS-free water from the laboratory performing the PFAS analysis for use as the PFAS rinsate blank.

Ambient FRBs will be collected at every sampling location by transferring pre-preserved PFAS-free water provided by the PFAS laboratory to a clean sample container. Ambient FRB results will be used to assess whether ambient contamination may be present that may impact sample results.



Temperature blanks will be placed in each sample cooler and used to determine whether samples have been adequately cooled during shipment and storage. The temperature blank will be prepared using tap water placed in a watertight bottle or vial without preservative.

5.2 LABORATORY QUALITY CONTROL

Samples will be shipped to the assigned Tier IV DAS laboratory. Laboratory QC measures will consist of all QC elements identified in the analytical method, as required by EPA Region III policy, and will incorporate all reportable QC (including forms and deliverables) required by the method and this FSP.

Matrix spike/matrix spike duplicate (MS/MSD) sample results are used to assess analytical precision and accuracy in a specific sample matrix. WESTON field personnel will collect a minimum of one MS/MSD for PFAS) per 20 samples of the same matrix. For water samples, the MS/MSD sample will require collection of a triple volume of sample. See Table 1, Analytical Parameters, Containers, and Holding Times Table, for a summary of QA/QC samples being collected.

5.3 DATA VALIDATION

Validation of all analytical data will be performed by the Environmental Services Assistance Team (ESAT) contractor under the direction of the OASQA Branch. Organic data will be validated at the Organic Level 2 level in accordance with EPA *National Functional Guidelines for Organic Superfund Methods Data Review (SOM02.4)*, EPA-540-R-2017-002 (EPA, 2017).

5.4 DATA EVALUATION AND MANAGEMENT

This section describes how WESTON will evaluate data generated from the sampling event, determine whether data are representative of the Site, and make certain that data are secure and retrievable.

5.4.1 DATA EVALUATION

WESTON will review the data validation reports to determine whether any major or minor deficiencies were encountered during sampling and analysis. These deficiencies may include major deficiencies (such as unusable or rejected data) or minor deficiencies affecting data, including data that were estimated or qualified due to the failure to meet project-specific or National Functional Guideline QC acceptance limits.



To assess the effectiveness of field sampling procedures and implement corrective actions as needed, WESTON will evaluate field blank results. Rinsate blank contamination, not otherwise attributed to laboratory sources, may be due to inadequate decontamination procedures or contamination in source water used for the rinsate blank. FRB contamination, not otherwise attributed to laboratory sources, may be due to ambient field contamination present during sampling or to source water used for the FRB. Failure of the temperature blank to meet the temperature acceptance criteria indicates the need to better ice down the samples.

5.4.2 DATA REPRESENTATIVENESS AND COMPLETENESS

The intent of this FSP is to obtain a complete data set that is representative of site conditions. Data will be reviewed for completeness. If not all samples were collected, resulting in less than 100% completeness, the reason for the data gaps will be identified in the SI Report. If any data are rejected, the reason for the data rejection will be discussed in the SI Report. If sampling activities or procedures vary significantly from this FSP due to unexpected conditions in the field or other unforeseeable factors, WESTON will discuss in the SI Report these deviations from the FSP and whether the changes affect data representativeness.

5.4.3 DATA MANAGEMENT

EPA Region III will provide WESTON with a validation report for the analytical data in portable document file (PDF) format along with an importable Excel electronic data deliverable (EDD). WESTON will upload the EDD data to the Scribe database and compare the EDD results to the sample results received in pdf format in conjunction with the data validation report to ensure their consistency. All electronic data will be stored in a Scribe database for future retrieval and reference, based on the Work Assignment Manager (WAM) requirements.

6.0 SCHEDULE AND DELIVERABLES

WESTON anticipates that sample collection will take place the week of March 25, 2019. WESTON will ship samples to the assigned laboratory for analysis. WESTON expects to receive unvalidated analytical data from the laboratory within 7 to 10 working days of receiving the samples. WESTON anticipates receiving the validated analytical data from EPA Region III approximately 21 days after the



Region received the unvalidated data. WESTON will provide EPA with the SI Report within 60 days after all site activities have been completed and validated data are available.

Information obtained during the sampling event will be compiled into an SI Report. The SI Report will discuss data collection methods and document sampling locations and include data summary tables, figures, maps, and site photographic documentation.



7.0 REFERENCES

- EPA (U.S. Environmental Protection Agency). 1996. *Ground Water Issue: Low-Flow (Minimal Drawdown) Ground-Water Sampling Procedures*. Prepared by Robert W. Puls and Michael J. Barcelona. Superfund Technology Support Center for Ground Water, Office of Solid Waste and Emergency Response. EPA/540/S-95/504. April.
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FIGURE

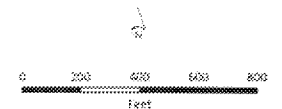
Ex. 9 Wells

Legend

- ⊗ Public Supply Well
- ⊕ Existing Precinct Groundwater Monitoring Wells
- ▲ Intermediate Well (between 20 and 40 feet bgs)
- ▲ Shallow Well (less than 20 feet bgs)
- ⊕ EPA Installed Monitoring Wells
- ⊗ Intermediate Well (between 20 and 40 feet bgs)
- ⊗ Shallow Well (less than 20 feet bgs)
- ⊗ Deep Well (greater than 65 feet bgs)
- Former Peninsula Paving Facility
- Former Blades Commercial Complex
- Precinct Paving
- Town of Blades Boundary

Imagery: ESRI, Bing Mapping Service
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Coordinate System:
NAD83 / FAD Zone 18N feet



Blades Groundwater
Blades, Sussex County, DE

Figure 1
March 2019
Groundwater Sample Location Map

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W303-04-01-001



TABLE



Table 1
Analytical Parameters, Containers and Holding Times Table

Matrix	Parameter	Analytical Method	Container Type	Preservative	Detection Limit	Technical Holding Time	Number of Field Samples	Number of Field Duplicates	Number of Designated Lab QC Samples ¹
Groundwater	PFAS	EPA 537 ver.1.1	2 x 250-mL HDPE	1.25g of Trizma® per bottle, Ice	0.010 to 0.090 µg/L	14 days (to extract) 28 days (to analyze)	16	2	1 MS/MSD
Aqueous Blank Samples (FRB, RB)	PFAS	EPA 537 ver.1.1	2 x 250-mL HDPE	1.25g of Trizma® per bottle, Ice	0.010 to 0.090 µg/L	14 days (to extract) 28 days (to analyze)	16 FRB 1 RB/day ²	0	0

Notes:

¹ Designate 1 sample per 20 samples for laboratory QC (i.e., MS/MSD for PFAS). A triple volume is required for the water PFAS MS/MSD analysis.

² Rinsate Blanks will only be collected from non-dedicated sampling equipment

EPA = U.S. Environmental Protection Agency
FRB = field reagent blank
HDPE = high-density polyethylene
mL = milliliter
µg/L = microgram per Liter
MS/MSD = matrix spike/matrix spike duplicate
PFAS = polyfluorinated alkyl substances
QC = quality control
RB = Equipment Rinsate Blank